Final Exam Review: Practice Set B

Name: Key!

Math 3

1. You've doodled in class, and to your surprise, discover that it has a mathematical pattern. Your pattern has 8 concentric triangles. The innermost triangle has 3 shaded blocks. Each successive triangle has 6 more shaded blocks. How many shaded blocks are there in all?

A) 45 B) 148 C) 144 D) 192

3	9	15	21
27	33	39	45

2. Let $f(x) = x^3 - 6x^2 + 10x - 6$ and $g(x) = x - 3$. What is the solution set for $\frac{1}{2} f(x) = g(x)$?

$\frac{1}{2}(x^3-6x^2+10x-6) = x-3$

$x^3-6x^2+10x-6 = 2x-6$

$x^3-6x^2+8x = 0$

$x(x^2-6x+8) = 0$

$x(x-4)(x-2)=0$

$x=0, x=4, x=2$

A.) -6, -3, 3 B) 0, 3, 6 C) -1, -2, 3 D) 0, 2, 4

3. The equations $3x^2 + 6x = 4$ is rewritten in the form $3(x-h)^2 + q = 0$. What is the value of q ?

$3x^2+6x-4=0$ vertex: $(-1,-7)$ $h=-1$ $q=-7$

A) -7 B) -1 C) 1 D) 7

3-B. The equations $3x^2 + 6x = 4$ is rewritten in the form $3(x-h)^2 + q = 0$. What is the value of h ?

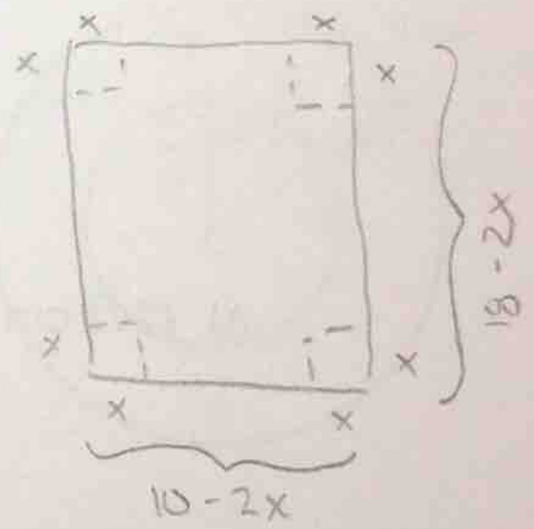
B) -7 B) -1 C) 1 D) 7

4) A box with an open top is going to be constructed from a rectangular piece of cardboard.

- The cardboard measures 10 x 18 inches.
- The box is formed by cutting equal sized squares of side x, from the corners of the cardboard, then folding the sides up.

What is the domain of the function V(x) that gives the volume of the box?

$V = x(10-2x)(18-2x)$



A) $0 < x < 5$ B) $0 < x < 9$ C) $0 < x < 10$ D) $0 < x < 18$

5. A function is shown: $f(x) = \begin{cases} \frac{x+5}{x-1} & x \le -2 \\ -x^2 + 3x & -2 < x < 1 \\ 4(x)^3 & x \ge 1 \end{cases}$

What is the value of $f(-2) + 2f(-1) - f(2)$

$f(-2) = \frac{-2+5}{-2-1} = \frac{3}{-3} = -1$

$f(-1) = -1(-1)^2+3(-1) = -4$

$f(2) = 4(2)^3 = 32$

A) 23 B) 28 C) 37 D) 39 E) -41

$-1 + 2(-4) - 32 = -41$

6. Which equation goes to positive infinite the fastest as x goes to infinity?

A) $y = 5x^2$ B) $y = 0.025x^4$ C) $y = 5\ln x + 10$ D) $y = \frac{1}{2} e^{x-7}$

Any function w/ x in the exponent will increase the fastest.

7. Which expression is equivalent to: $\frac{(\sin^2\theta - \cos^2\theta)}{(\sin^4\theta - \cos^4\theta)}$

A) $\frac{1}{\sin^2\theta - \cos^2\theta}$

B) ½

C) 1

D) $\frac{1}{\sin^2\theta + \cos^2\theta}$

$\frac{\sin^2\theta - \cos^2\theta}{(\sin^2\theta + \cos^2\theta)(\sin^2\theta - \cos^2\theta)} = \frac{1}{\sin^2\theta + \cos^2\theta} = \frac{1}{1}$

8. The diameter of an apple pie is 9 inches. If the intercepted arc (the crust) is 3 inches, what is the measure of the central angle made by cutting your slice of pie. Give your answer in radians.

A) $1\pi/3$ B) $1/3$ C) $2/3$ D) $2\pi/3$

Arc length = θ radius $\quad 3 = 4.5\theta$

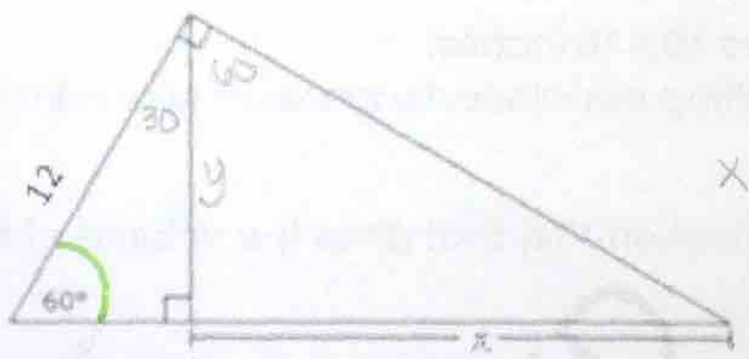
$\theta = 2/3$

9. What is the value of x in the triangle below?

$\sin 60 = \frac{y}{12}$

$12 \sin 60 = y$

$y = 10.3923$



$\tan 60 = \frac{x}{10.3923}$

$x = 10.3923 \tan 60$

$x = 18$

A) $12\sqrt{3}$ cm B) 16 cm C) $6\sqrt{3}$ cm D) 18cm

10. The amount of tissue paper used to cover a spherical ball is 144 square inches. What is the volume of the ball? Hint: $SA = 4\pi r^2$ $V = 4/3\ \pi r^3$

A) 48 /π units cubed B) $\frac{288}{\sqrt{\pi}}$ units cubed C) 48π units cubed D) $288\sqrt{\pi}$ units cubed

$144 = 4\pi r^2$

$r^2 = \frac{36}{\pi}$

$r = \frac{6}{\sqrt{\pi}}$

$V = \frac{4\pi}{3}\left(\frac{6}{\sqrt{\pi}}\right)\left(\frac{6}{\sqrt{\pi}}\right)\left(\frac{6}{\sqrt{\pi}}\right)$

$V = \frac{288\pi}{\pi\sqrt{\pi}} = \frac{288}{\sqrt{\pi}}$

A farmer wants to buy between 80 and 100 acres of land. He is willing to pay up to $950 an acre. There is a rectangular field for sale that is 200 by 2,000 yards that is selling for $75,000. Would this property meet the farmer's requirements? 600 x 6000 feet

(1 acre = 43,560 ft²)

Area = $\frac{3,600,000}{43560}$ ft²

A. Yes, the land is the right size and the price is low enough
B. No, the price is low enough, but there is too much land
C. No, the price is low enough, but there is not enough land
D. No, the land is the right size, but the price is too high

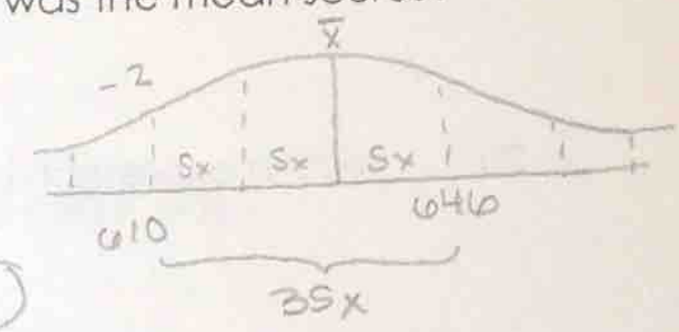
Area = 82.64 acres ✓

price/acre = $\frac{\$75000}{82.64} = \$907.50$ ✓

12. Guidance is trying to determine which electives to offer next year, and have decided to take a poll. Which would represent their polling population?

A) Students at the school whose student I.D. ends with and odd number.
B) All students in the school
C) All students in the state
D) All adults in the state

13. In a set of test scores that is normally distributed, a score of 610 is two standard deviations below the mean, and a score of 646 is one standard deviation above the mean. What was the mean scores?



A) 12 B) 574 C) 628 D) 634

$610 + 35_x = 646$ $S_x = 12$ $646 - 12 = 634$

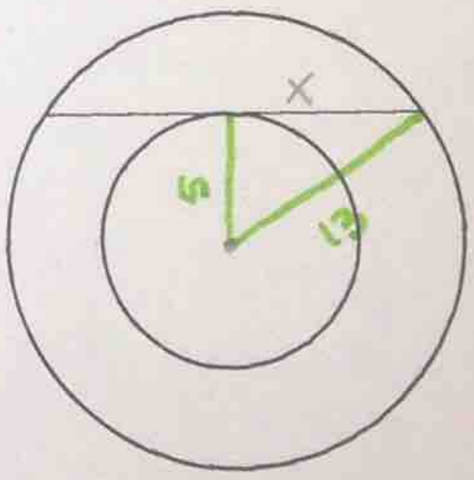
14. Which expression is equivalent to: $cos\theta\left(\frac{\sin\theta}{cos\theta} + \frac{cos\theta}{sin\theta}\right)$

$\cos\theta\left(\frac{\sin\theta}{\cos\theta}\cdot\frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta}\cdot\frac{\cos\theta}{\cos\theta}\right)$

$\cos\theta\left(\frac{\sin^2\theta + \cos^2\theta}{\sin\theta\cos\theta}\right) = \frac{1}{\sin\theta}$

A) $\sin\Theta$ B) $\cos\Theta$ C) $\frac{1}{cos\theta}$ D) $\frac{1}{sin\theta}$

15. The radii of two concentric circles are 5 and 13. Find the length of the Chord.



$x^2 + 5^2 = 13^2$

$x^2 = 144$

$x = 12$

A) 8 B) 12 C) 16 D) 24

chord = 2(12) = 24

16. What is the approximate length of the arc on a circle formed by an angle of 2π/3 radians, and a radius of 4.

Arc Length = θr

$AL = \frac{2\pi}{3}(4)$

AL = 8.37

A) 4.19 B) 8.38 C) 33.51 D) 105.27

17. The length and width of a rectangular prism are $3\sqrt{21}$ *and* $5\sqrt{14}$ respectively. What could the height be if the volume is a rational number?

$3\sqrt{21}$ $3\sqrt{7}$ $5\sqrt{14}$ $2\sqrt{7}$

need another 3 and 2

$V = LWh$

$V = (3\sqrt{21})(5\sqrt{14})(2\sqrt{6})$

$V = 1260$

A) $2\sqrt{2}$ B) $2\sqrt{3}$ C) $2\sqrt{5}$ D) $2\sqrt{6}$

$3\sqrt{2}$

18. Which is a solution to the equation $\frac{x+5}{x-4} = \frac{x+3}{x-5}$

$(x+5)(x-5) = (x-4)(x+3)$

$x^2 - 25 = x^2 - 1x - 12$

$-25 = -1x - 12$

$x = 13$

A) -13 B) -1 C) 1 D) 13

19. Which function is equivalent to $y = x^2 - 6x + 3$

$\left[\frac{-6}{2}\right]^2 = 9$

A) $y = (x-3)^2 + 12$

B) $y = (x-3)^2 - 6$

C) $y = (x-3)^2 - 9$

D) $y = (x-3)^2 + 6$

$y - 3 = x^2 - 6x$

$y - 3 + 9 = x^2 - 6x + 9$

$y + 6 = (x-3)^2$

$y = (x-3)^2 - 6$

20. Which expression is equivalent to $\frac{x^2-3x-10}{x^2-2x-15} \div \frac{x+2}{x^2+7x+12}$

A) ½ B) 2 C) $\frac{x+10}{x+9}$ D) $\frac{x+4}{x+2}$ E) $x+4$

$\frac{(x-5)(x+2)}{(x-5)(x+3)} \cdot \frac{(x+4)(x+3)}{x+2} = x+4$