

Perimeter = add up lengths of all sides

Area = length*width

Volume = length*width*height

Surface Area of Rectangle = add up areas of all sides

Distance between (x_1, y_1) and (x_2, y_2) = $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Area of Circle = πr^2

Circumference of Circle = $2\pi r$

Volume of Sphere = $\frac{4}{3}\pi r^3$

Surface Area of Sphere = $4\pi r^2$

Volume of Cylinder = $\pi r^2 h$

Surface Area of Cylinder = $2\pi r h + 2\pi r^2$

MATH 1100-005 EXAM 2 (100 Points)

For full credit:
SHOW all work & LABEL all graphs!
BOX all answers!

Name(1pt):_____

1. (12pts) Find $\frac{dy}{dx}$ for

(a) $xy^2 = 5y$

(b) $y^4 + 3y = x$

2. (7pts) Find the slope of the tangent line of $x^2 + y^2 = 10$ at $(1,2)$.

3. (8pts) For $f(x) = (x - 1)^3(x - 5)$

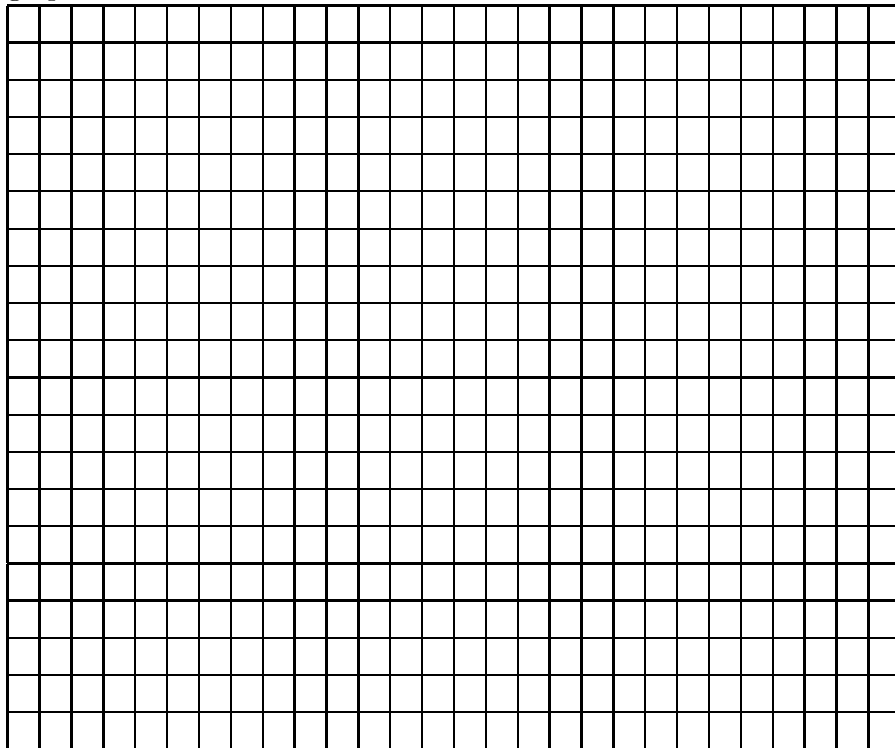
(a) find the inflection points.

(b) find the intervals of concavity.

4. (8pts) For $y = (x - 2)^3$,

(a) find the critical values.

(b) graph the function



5. (16pts) For $f(x) = -3x^5 + 5x^3$,

(a) find where $f(x)$ is increasing.

(b) find where $f(x)$ is decreasing.

(c) find where $f(x)$ is concave up.

(d) find where $f(x)$ is concave down.

6. (10pts) For $f(x) = x^4 - 2x^3$, find the relative extrema using:

(a) the 1st derivative test.

(b) the 2nd derivative test.

7. (10pts) A company finds that selling advertising is given by $y = \frac{1}{10}x^3 + 6x^2 + 400$, where x is the advertising cost.

(a) Find the point of diminishing return.

(b) Explain what it means to have diminishing returns.

8. (14pts) Given that the price for selling glasses of lemonade is given by $p(x) = 1.75 - 0.0025x$ and the cost is $C(x) = 20 + 0.05x$,

(a) Find the maximum profit.

(b) When the profit is maximized, what is the average cost?

9. (14pts) For a price given by $p(x) = \frac{100}{x^2} + 2$, find

(a) the price elasticity of demand when 10 units are sold.

(b) the intervals of elasticity.

10. (5pts) **EXTRA CREDIT**

When a wholesaler sold a product at \$40 per unit, sales were 300 units per week. After a price increase of \$5, however, the average number of units sold dropped to 275 per week. Assuming that the demand function is linear, what price per unit will yield a maximum total revenue?

11. (5pts) **EXTRA CREDIT**

A Norman window is constructed by adjoining a semicircle to the top of an ordinary rectangular window. Find the dimensions of a Norman window of maximum area if the total perimeter is 16 feet.