

Math 5A Final Exam
Spring 2020

Return this page
with your exam.

Name _____

① I will not cheat on this exam. I can use my homework, notes and the text book. I will not use any web-sites, tutors or any other helps.

My name is : { Print Name: _____
signature: _____

Show work and solutions for the following problems and return to me by Friday, June 12, 2020 (latest). You have unlimited time to finish this exam.

② Find $f'(x)$ if $f(x) = \frac{1+4x}{3-5x}$

③ For what values of x does the graph of $f(x) = x + 2\sin x$ have a horizontal tangent? Assume $-2\pi \leq x \leq 2\pi$.

④ Find the limit: $\lim_{x \rightarrow 0} \frac{\sin 5x}{\tan 4x}$

⑤ Find $f'(x)$ and determine for what values of x that $f'(x) = 0$
 $f(x) = (3x-1)^4(x^2+x)^5$

⑥ Find $\frac{dy}{dx}$ if $x \sin y = y \cos x$

⑦ The radius of a sphere is increasing at a rate of 4 mm/sec . How fast is the volume increasing when the radius is 80 mm ?

Hint: $V = \frac{4}{3} \pi r^3$

⑧ Find the absolute maximum and absolute minimum of
 $f(x) = x^3 - 6x^2 + 5$ on $[-3, 5]$.

Math 5A Final Exam (continued)

- (9) sketch the graph of $f(x) = 2\sqrt{x} - 4x^2$ and find the following:
- (a) intervals of increase/decrease
 - (b) local max. and local min.
 - (c) intervals of concavity and inflection points
- (10) Find $\lim_{x \rightarrow \infty} \frac{\sqrt{2x^2+1}}{3x-5}$ and $\lim_{x \rightarrow -\infty} \frac{\sqrt{2x^2+1}}{3x-5}$
- (11) Find the point on the line $y = 3x+4$ that is closest to the origin.
- (12) Find $\int (x^2-3x+4)^5 (4x-6) dx$
- (13) Find $\int_0^{\sqrt{\pi}} x \cos(x^2) dx$
- (14) Find the area between the curves $y = \sin x$ and $y = \cos 2x$ for $0 \leq x \leq \frac{\pi}{2}$
- (15) Find the volume of the solid that is generated when the region bounded by $y = x$ and $y = x^2$ is revolved about the x -axis.
- (16) A spring has a natural length of 40 cm. If a 50 Newton force is required to stretch it to a length of 70 cm, how much work is required to stretch it from its natural length to a length of 80 cm?
- (17) Find the average value of $f(x) = x^2$ on $[0, 3]$.