

(答案請寫於答案卷上)
需列計算過程，否則不予計分
填充計算題 (總計10題，每題10分)

1. Is there a number m such that $\lim_{x \rightarrow -2} \frac{3x^2 + mx + m + 3}{x^2 + x - 2}$ exist? If so, find the value of m and the value of the limit.
2. How many tangent lines to the curve $y = x / (x + 1)$ pass through the point $(1, 2)$? At which points to these tangent lines touch the curve?
3. Differentiate the function: $g(x) = \frac{\ln x}{1 + \ln(2x)}$.
4. Find the local maximum and minimum values and saddle point(s), if any:
 $f(x, y) = (x^2 + y^2)e^{y^2 - x^2}$.
5. An oil-refinery is located on the north bank of a straight river that is 2 km wide. A pipeline is to be constructed from the refinery to storage tanks located on the south bank of the river 6 km east of the refinery. The cost of laying pipe is \$400,000/km over land to a point P on the north bank and \$800,000/km under the river to the tanks. To minimize the cost of the pipeline, where should P be located?
6. Evaluate the following equation: $\int_0^1 \log \frac{1}{1-x} dx =$ _____.
7. Evaluate the following equation: $\int_0^{\infty} \frac{\sin x \cos x}{x} dx =$ _____.
8. Find the mass of the portion of the plane $x + y + z = 1$ in the first octane if the area density at any point (x, y, z) on the surface is kx^2 kilograms per square meter, where k is a constant.
9. Evaluate the following equation: $\int_0^{\infty} \frac{(\arctan x^2)}{x^2} dx =$ _____.
10. Find the volume of the solid bounded by the cylinder $x^2 + y^2 = 25$, the plane $x + y + z = 8$, and the xy plane.

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試題隨卷繳回